EFFECTS OF THE WEATHER ON HUMAN HEALTH.

[Reprinted from *Memphis Commercial Appeal*, Nov. 23, 1919.]

There are certain persons whose physical feelings vary with the weather, and in certain diseases the weather plays an important part in recovery or decline. Dr. A. Campani, of Milan, classifies these into three groups: The first includes headache, sensations of heat, irritability, suppression of secretions, and hemorrhage of the lungs; the second includes intestinal catarrhal disturbances, sleeplessness, and loss of appetite; the third comprises rheumatic pains, pains in old scars, etc.

In the *Gazetta degli Ospedali e delle Cliniche* (Milan) he analyzes 24,528 cases, exclusive of contagious diseases, and shows that the morbidity is least in the windy periods, especially in winter, while the highest morbidity accompanies periods of cloudy skies. As a general rule, he says, the best conditions for health seem to be during or immediately after the great atmospheric convulsions and the fair weather that follows them. The morbidity is highest during the periods of stagnation preceding storms, with a constant temperature, generally rather above the mean, the sky cloudy, and only weak atmospheric currents. The greater the fluctuations in the temperature of the 24 hours the less the morbidity, especially when the humidity is high. The northwest winds in winter and the southwest in summer seemed to be the most favorable for health in general. The influence of the weather on the development of plants and crops is so evident that he is convinced that physicians may well study the subject in the interests of patients.

SUNSHINE AND HEALTH IN ENGLAND.

In the October, 1919, number of the *Quarterly Journal of the Royal Meteorological Society* (pp. 309–310) Mr. W. H. Dines discusses a statistical study of the relation between the death rate, temperatures, and sunshine in England. Between death rate and temperature, he finds, as one would expect, a large negative correlation coefficient in winter, and a large positive coefficient in summer. There seems to be no significant relation between the duration of sunshine and the death rate. He concludes his note with the statement that "England, notorious for its absence of sun, is one of the most healthy climates in the world, while very sunny climates, like Egypt and South Africa, have a distinctly high death rate."—*C. L. M.*

MUNICIPAL WEATHER SERVICE OF PARIS.

In a letter to the Chief of the United States Weather Bureau dated at Paris, July 22, 1920, Louis Besson, Chief of the Physical and Meteorological Service connected with the Division of Hygiene of the Préfecture de la Seine, states that his service has as its principal object the application of meteorology to public hygiene:

"* * * It also furnishes all useful information on meteorological phenomena which concern the Department of the Seine; and in addition contributes, within the limits of its means, to the progress of meteorology in general.

"Our pluviometric net is now reorganized. In a circle of about 17 kilometers radius we have 60 stations supplied with rain gages of the same type. It is possible to make detailed charts of rainfall.

"For temperature, the net is less complete and less homogeneous. We are gradually putting into service a number of small English shelters containing maximum and minimum thermometers which will be less affected by influences of location than those in our French shelters. The object is to study the important question of the influence of the city of Paris upon the temperature as related to wind direction—an influence which varies from point to point and which it will be useful to determine exactly."—*E. W. W.*

IRREGULAR ATMOSPHERIC REFRACTION AT HIGH ALTITUDES.

By ERIC R. MILLER, Meteorologist.

[U. S. Weather Bureau Office, Madison, Wis., Sept. 17, 1920.

SYNOPSIS.

Irregular atmospheric refraction is assigned as the cause of distortion and extinction of the image of the pilot balloon in the observing telescope after the balloon passed through a surface of velocity-discontinuity at altitudes of seven to ten thousand meters.

In the pilot balloon work at Madison, Wis., the author has been struck by the suddeness of disappearance of the balloon that often occurs with a perfectly clear sky. The observer's usual remark in these cases, "It was perfectly plain a moment ago, but I can't see it now," indicates that the fading out occurs in much less than the minute-interval between the reading of the theodolite circles, and probably in a few seconds.

During the present summer there have been an unusual number of flights in which the balloon ascended nearly vertically. Under this condition it has been noticed that the extinction occurred after a sudden change in the speed of the balloon. In some flights the extinction has been only partial, so that the balloon has been followed long enough to ascertain that the fading out was not due to the leaking of gas.

On several occasions, much less often than the extinction, the balloon has been observed to become double in the field of the telescope, so that the observer has been puzzled to decide which balloon to point on.

On August 25, 1920, Assistant Observer Wildeman, who was pointing the telescope, remarked a curious elongation of the balloon. The author, who was recording the readings of the theodolite circles, looked into the telescope and saw the balloon sausage shaped, and sidling across the field irregularly, like the helpless wriggling of the larva of an insect.

The exact circumstances have been noted in four of these instances, and the numerical data are given in Table 1, the graphs of the velocity and direction with reference to altitude appear in figure 1, and the distribution of pressure over the country at the times of these flights in figures 2, 3, 4, and 5.

TABLE 1.

Date.	Time (90th meridian).	Altitude.	Azimuth from south.	Altitude above horizon.	Phenomenon.
1920.		*Meters.*	°	°	
Aug. 14	8:06 a. m.	7,998	139	41	Became faint.
Aug. 24	8:14 a. m.	9,216	191	38	Do.
Aug. 25	7:59 a. m.	7,560	199	44	Distorted, sausage shape.
Sept. 2	8:25 a. m.	10,450	105	25	Lost 75 per cent brightness in a few seconds.

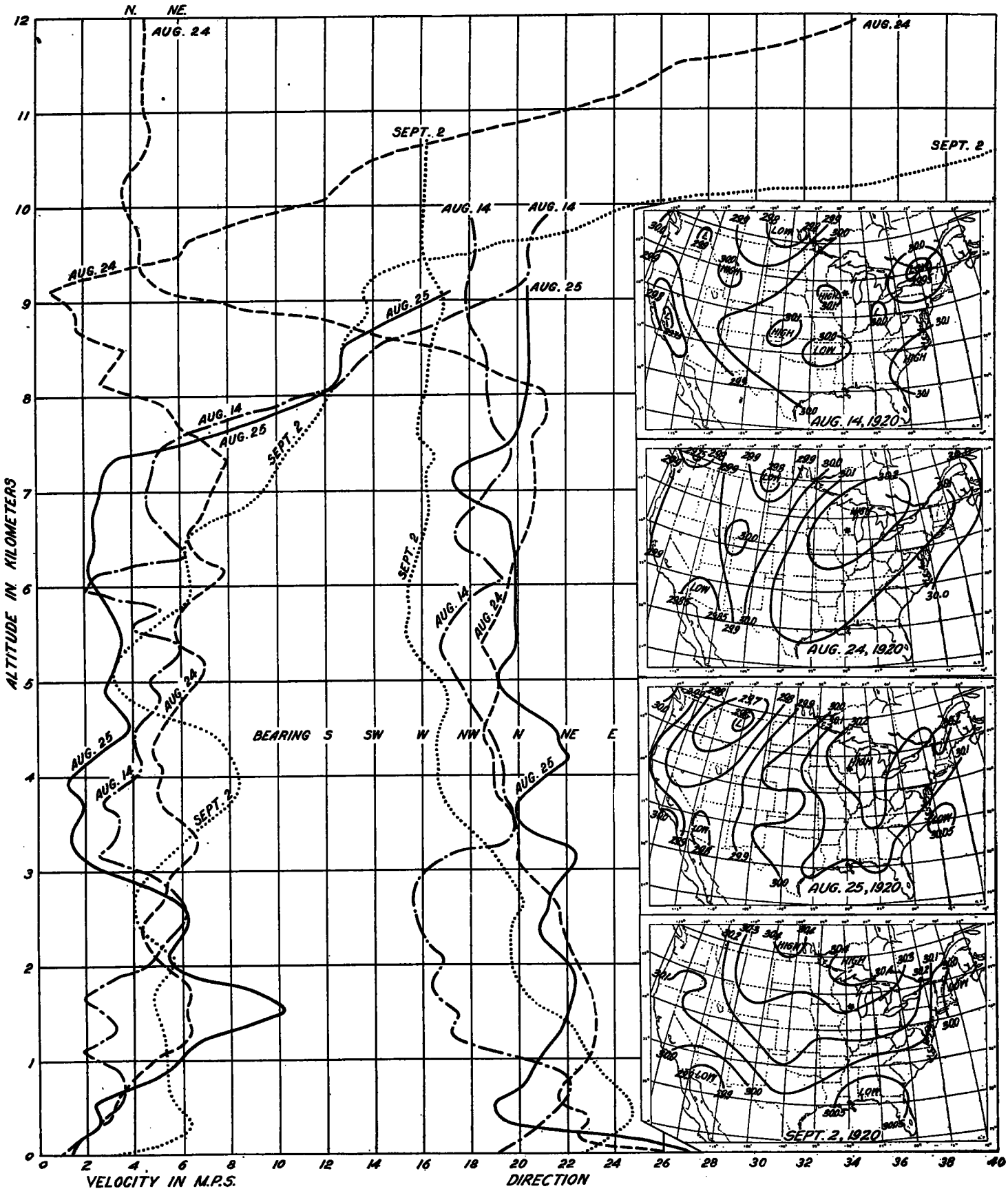

FIG. 1.—Changes of direction and velocity with altitude at Madison, Wis., with various distributions of atmospheric pressure.

On the afternoon of August 25 the balloon was followed to an altitude of nearly 20,000 meters. It became faint as in the morning, but as the altitude was not noted exactly it is not known how it was related to the changes in velocity of the balloon. The visibility of the balloon improved afterwards.

The altitude at which distortion or extinction occurred is marked on the graphs, figure 1. It will be seen that the disturbance occurred in each case after a sudden increase in the velocity of the balloon. The interval was small on August 14 (3 minutes), August 24 (1 minute), and August 25 (2 minutes), but longer on September 2 (7 minutes).

In the absence of temperature observations it is impossible to know whether the velocity discontinuity was accompanied by a temperature discontinuity, but if it were, then detached "lenses" of air of different temperature and density may have caused the observed disturbances of refraction.

Leaking would cause extinction of the balloon, and seeming increase in the velocity on account of the failure of the balloon to maintain the assumed rate of ascent upon which is based the calculation of the position of the balloon by the one-theodolite method used at Madison. The intervals of 10 and 14 minutes after the sudden partial extinction noted on August 14 and 24 during which the balloon was followed, and the speeding up of the balloon for 20 minutes before the sudden extinction on September 2, are thought to eliminate the possibility that leaking has caused the phenomenon here reported.

The possibility that the distortion of the balloon image on August 25 was due to eyestrain was eliminated by the change of observers. That it was not due to internal reflections in the optical system of the theodolite is proven by the wriggling motion of the balloon image.

THE RELATION OF TELESCOPIC DEFINITION TO COLD WAVES.

By W. H. PICKERING.

[Mandeville, Jamaica, June 21, 1920.]

Telescopic definition, or "seeing," as it is technically called, depends mainly on the currents located in our atmosphere up to an altitude of 3 or 4 miles. Their velocity is of little consequence, variations in their temperature forming the controlling influence. In the temperate zones a high barometer and cold wave are most injurious to the seeing; in the Tropics, the vicinity of a hurricane. The seeing is measured on a scale of 12, and is at its worst in Jamaica during the winter months, when the circulation of the temperate zone, with its westerly winds, sometimes reaches us. This it is especially liable to do at night.

The seeing is recorded here nearly every night when it is clear, and often several times during the evening. The upper graph in figure 1 represents the seeing during the three months of January, February, and March, 1920. The angles of the shaded regions indicate the dates when it was found to vary. The second graph indicates the readings of our minimum thermometer, and the short vertical lines at the bottom, the dates when a "high" in Florida or Georgia is found on the daily maps of the Weather Bureau.

An examination of the figure shows that there were seven periods when the seeing was inferior. These are indicated by the letters *a*, *a'*, *b*, *c*, *d*, *e*, and *f*. All cases except the second and next to last were followed by low minima on the second graph. In the latter case the minima were quite irregular. It will be noted that everyone of the five cold periods, *a*, *b*, *c*, *d*, *f*, was preceded by bad seeing. It therefore appears, as far as these observations go, that cooler nights can often be foretold about three days in advance by means of the upper air currents through their production of bad seeing.

In January and February every HIGH in Florida and Georgia was preceded by a low minimum in Jamaica. It did not seem necessary to letter all of them. Only 3 dates out of the 15 failed, namely, March 2, 27, and 30. The interval was usually two to three days, but the warning of bad seeing came nearly a week in advance. Whether a HIGH is found on the weather maps during the first four days in April the writer does not know.[1] This investigation suggests that the same general atmospheric drift that carries the hurricanes northerly in these longitudes, into our extreme southern States, carries the HIGHS as well.[2]

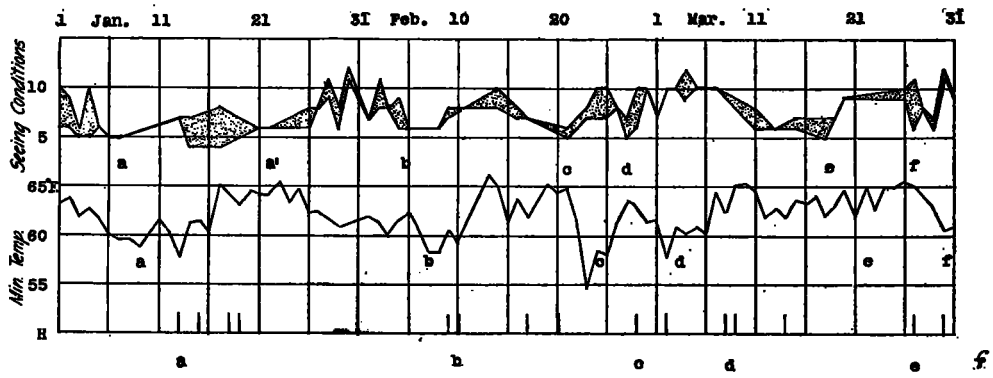

FIG. 1.—"Seeing" during January, February, and March, 1920, at Mandeville, Jamaica.

AN UNUSUAL LUNAR HALO PHENOMENON.

The accompanying figure 1 represents a lunar halo observed by Mr. A. A. Graham, about 8 p. m., September

[1] A weak HIGH moved across the South from the 1st to 3d, and was central in Georgia on the night of the 2d.—EDITOR.

[2] This explanation seems questionable, and the following connections more likely: With the passage of a LOW on the north, the cold winds on the back side first affect the upper levels and produce bad seeing, which is followed in two or three days by the arrival of the slower-moving lower winds at Jamaica, producing the minimum temperatures. In about three days more the HIGH which followed the LOW is, naturally, in the Southeastern States.—EDITOR.